U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-286 116

Inland Water Pollution Follow-Up Report

(U.S.) NATO Committee on the Challenges of Modern Society, Brussels (Belgium)

Apr 78

PB 286 116

NATO CCMS

OTAN CCMS

COMMITTEE ON THE CHALLENGES OF MODERN SOCIETY

INLAND WATER POLLUTION

FOLLOW-UP REPORT

Number 79

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO. NATO/CCMS 79	2.	3. RECIPIENT'S ACCESSION NO. PB286116
4. TITLE AND SUBTITLE Inland Water Pollution Follow-Up Report		5. REPORT DATE April 1978 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Same as box 12		10. PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS North Atlantic Treaty Organization Committee on the Challenges of Modern Society		13. TYPE OF REPORT AND PERIOD COVERED 14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

16. ABSTRACT

In October 1974 the pilot study of the NATO/CCMS was completed with the publication of "Inland Water Pollution", NATO/CCMS Report 36. Canada was the pilot country for the study and Belgium, France and the United States acted as co-pilots. The study had two main goals: (1) to demonstrate ways in which countries can cooperate in reducing water pollution to their mutual benefit, and (2) to develop improved techniques and concepts for water quality management that would be of broad interest to member countries in dealing with internal and international problems of freshwater pollution. To assess the study effectiveness, this post-evaluation was carried out. This report represents the results of a member country poll, centered around the original study recommendations, regarding measures which countries have taken to manage the quality of their inland waters.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES 18
	20. SECURITY CLASS *(This page)*	22. PRICE A02 - A01

EPA Form 2220-1 (9-73)

INLAND WATER POLLUTION

FOLLOW-UP REPORT

AVRIL 1978

CONTENTS

	Page
Foreword	iv
Introduction	1
Comprehensive River Basin Water Quality Planning and Management	1
Indirect Instruments in Water Management	4
The Use of Models for Management Decision Making	7
Determination of Water Quality Objectives and Standards in International Water Courses	9
Summary	11

FOREWORD

Article 2 of the North Atlantic Treaty provides that the NATO countries will contribute towards the further development of peaceful and friendly international relations by promoting conditions of stability and well-being. To further this objective, the North Atlantic Council in November 1969 established a Committee on the Challenges of Modern Society (CCMS). The Council directed the Committee to "examine how to improve, in every practical way, the exchange of views and experience among allied countries in the task of creating a better environment for their societies... and to consider specific problems of the human environment with the deliberate objective of stimulating action by member governments".

Scientific, economic and cultural cooperation have been going on within the Alliance for many years. When governments decided to add the environmental dimension to the activities of the Alliance, it was in recognition of the dramatic challenge presented to our societies by the degradation of our environment which was taking place. They realized that these challenges could only be effectively tackled on an international basis and that NATO, with its long experience, could provide a uniquely cost-effective machinery to contribute to international efforts to deal with these immense tasks.

Among various international organizations the NATO Committee on the Challenges of Modern Society plays a special role. It selects clearly defined subjects for consideration which are then dealt with in pilot studies. This approach explains the success of the work undertaken by CCMS. Many of its results have now become guiding elements in the environmental planning of member states.

The results of the CCMS pilot studies are made accessible to everyone and in making available its working results the CCMS knows no political boundaries.

This current publication, Number 79, is an excellent example of the dissemination of follow-up results from a NATO/CCMS pilot project. The results of the original stud were published in Report Number 36 in October of 1976; the objectives of that study along with the resulting recommendations are reviewed in the introductory material of this follow-up report.

Follow-up to the NATO/CCMS Inland Water Pollution Project

Introduction

1. In October 1974 the pilot study of the NATO Committee on the Challenges of Modern Society (CCMS) was completed with the publication of "Inland Water Pollution", NATO/CCMS Report Number 36. Canada was the pilot country for the study and Belgium, France and the United States acted as co-pilots. The study had two main goals: (1) to demonstrate ways in which countries can cooperate in reducing water pollution to their mutual benefit, and (2) to develop improved techniques and concepts for water quality management that would be of broad interest to member countries in dealing with internal and international problems of freshwater pollution.

2. Recommendations evolving from the study covered four principal areas for action: (1) development of comprehensive river basin water quality planning and management - this essentially recommends to member nations that they should adopt the river basin for water quality planning purposes, and that the water quality management plan include full consideration of the scientific, technical, social, economic, financial and institutional aspects; (2) use of indirect instruments in water management - this recommendation encourages member nations to implement appropriate economic instruments, such as effluent fees, as well as to promote public participation in water management planning; (3) use of models for management decisions - this recommendation recognizes the facility of mathematical models for water quality planning and management, and encourages their use, exchange of knowledge between countries, as well as additional research; and (4) determination of water quality objectives and standards in international water courses - this recommendation encourages joint establishment of water quality objectives on international water courses, as well as the establishment of appropriate institutional arrangements between countries which would aid in the development of the objectives.

3. To assess the study effectiveness, this post-evaluation was carried out. This report represents the results of a member country poll, centered around the original study recommendations, regarding measures which countries have taken to manage the quality of their inland waters. Follow-up reports were received from Belgium, Canada, Federal Republic of Germany, France, Italy, Netherlands, Norway, Portugal, United Kingdom and the United States of America.

Comprehensive River Basin Water Quality Planning and Management

4. The geographic unit adopted in Belgium for planning and management of water quality is the river basin. Responsibility for water quality planning and management is under the jurisdiction of three basin authorities: Coast, Escaut and Meuse, and Seine and Rhine. These authorities are formed primarily from the appropriate provinces, relevant public groups concerned with surface water distribution, and industries whose wastes exceed minimum state standards, and who rely on the authorities to purify such wastes.

5. In Canada the federal government has legislative jurisdiction over navigation and fisheries, shares jurisdiction with the provinces over agricultural uses, and has legislative responsibilities with regard to interprovincial and

international undertakings. The provinces are regarded as the proprietors (or the "owners") of water resources within their boundaries (except for National Parks and Federal lands) and therefore, have a basic right to manage the water resources, authorize developments, license uses, regulate flows and levy fees. Municipalities come under provincial jurisdiction and are delegated responsibility for water supply and waste treatment. The Canada Water Act (1970) provides the basis for joint Federal-Provincial water management. Federal-Provincial study boards are formed to examine both quantity and quality aspects of river and lake basins, determine their problems, identify their opportunities, involve interested publics and apply the latest available knowledge to arrive at the best possible plan. The federal government has several other national strategies in this area. The most significant of these deal with water quality objectives, effluent standards, nutrient controls, and control of environmental contaminants.

6. General water schemes in the Federal Republic of Germany are established pursuant to article 36 of the Federal Water Act, with the aim of meeting the demands on the available water resources with respect to quality and quantity by adequate management. In the Federal Republic of Germany, planning in the field of water quality management is carried out in the form of (1) general water schemes which are established by the respective Länder in accordance with guidelines issued by the Federal Government for the establishment of such schemes, and nowadays (2) water management plans which will also be established by the Länder and will provide the basis for required measures of improvement. Both types of plan are normally drawn up for an entire river basin with its whole catchment area. On the other hand, water quality management in the Federal Republic of Germany is organized on a local or regional frame, according to political boundaries, seldom on the basis of river basins. In drawing up water management plans economic, social, scientific, technical and institutional elements are taken into account among other aspects. Effluent standards, according to § 7 a Federal Water Act, protect river water quality with regard to the destined use of the river, and - if necessary -- further limitations of discharge or other use of water are taken into account.

7. In France, water quality planning and management is carried out by six large river basin authorities (Artois-Picardie, Rhin-Meuse, Adour-Garonne, Loire-Bretagne, Rhône-Méditerranée-Corse, Seine-Normandie) through the five-year programs of the basin financial agencies. The planning objectives must correspond to those prescribed by the five-year national economic development plan. If regulations are applied at the departmental level, under the responsibility of the departmental head, coherence of administrative action is needed in the six river basins, through the basin mission delegate, of the responsible administrations.

8. Until the promulgation of Law No. 319 in Italy on May 10, 1976, the problem of protecting the waters against pollution had been dealt with in a fragmentary manner without the benefit of an organic body of laws. The law has the following purposes: a) the control of the discharge of waste water, public and private, direct and indirect, into surface waters and groundwaters, both fresh and saline, public and private, as into sewers, on the ground and into the subsoil; b) the formulation of general criteria for the use and the discharge of waters; c) the organization of public utilities: water supply system, sewers and waste water treatment plants;

d) the drawing up of a general plan for water quality improvement on a regional basis; and e) the inventory of the water resources in quality and quantity. The aforementioned tasks are assigned to the central offices of the Public Administration and to local authorities such as the regions, the provinces and the municipalities, according to their competencies. Intermediate and final qualitative levels will be reached gradually within a maximum period of nine years. These objectives are defined through the appropriate standards specifying the maximum pollution level allowable in the discharge of waste water.

9. The Pollution of Surface Waters Act came into force in the Netherlands on 1 December 1970. The introduction of this legislation opened up many legitimate ways of combating water pollution. A sound financial basis was also laid for the implementation of the necessary measures. The State is responsible for the management and quality of the larger water areas such as the Rivers Rhine, Meuse and Scheldt and Lake Yssel and the Waddenzee. In principle the provincial authorities are responsible for the remaining water areas but they can delegate this responsibility to local authorities. In either of the eleven provinces the implementation of the regulations has become the responsibility of water boards. The other three provinces have taken it upon themselves to supervise the quality of water. Decentralisation of the implementation of the Act has worked very well in practice. In particular it has meant that rapid intensification of the anti-pollution measures was possible. However, decentralisation also means that ways must be found to ensure the necessary coordination and uniformity of practice with regard to planning, granting permits and levying charges. The necessary organization has already been set up for this purpose.

10. The system for managing water quality in Norway has three main levels: state, county and municipality. Water quality aspects such as pollution from industry, municipalities and agriculture, and the quantitative aspects due to changes in the water flow caused by regulations are the responsibility of the Ministry of Environment. The State Pollution Control Authority is the main executive body for control of industrial and agricultural water pollution. The Authority issues discharge permits. The County State Office has recently been given the responsibility to grant and supervise non-industrial discharge permits for densely populated areas. Municipal authorities have the power to issue discharge permits for single houses and smaller groups of houses. The main vehicle for protection against water pollution is the Water Pollution Act (1971). The Act forbids pollution of water courses, ground water and to a large extent ocean areas (dumping) without permission. The basic rule is that discharge problems should be solved through comprehensive physical planning on a municipal and county level. The Act enables authorities to regulate pollution activities through regulations as an alternative to individual permits. Future legislation will primarily be based on three sets of regulations: in connection with areal planning, on effluent control, and on the control of products.

11. Portugal's inland waters management policy, from both a quality and quantity standpoint, suffers from a lack of supporting legislation and the existence of too many agencies claiming jurisdiction in this field. Until now, inland water quality has been managed by general legislation: e.g. Water Act (1892); General Urban Building Regulations (1952); and Act 2130 on

Water Supply Projects (1960). At this time, there are no official Portuguese standards for water quality or wastewater pollution parameters, although technical proposals have already been drafted by the Services involved. With a view towards establishing concerted action plans, and particularly drafting legislation based on the situation and the country's real possibilities, various Services have been involved in integrated studies of hydrographic basins for the past few years, irrespective of single actions determined by a wide variety of specific problems. In this way attempts are being made to combine the interests of the departments responsible for industrial implementation and operations, fisheries, water use and treatment, within an overall framework of environmental quality enhancement.

12. In the United Kingdom the river basin is the basic planning unit although most water authorities control more than one river basin catchment area. In England and Wales control is regionalized into ten water authorities. These water authorities have responsibility for their own finances, scientific planning, technical needs and public relations. Private water companies are not included in the organization of the water authorities.

13. The geographic unit for water quality management in the United States can be based on hydrologic units (e.g., a basin) or political units (e.g., Standard Metropolitan Statistical Areas which are usually multi-county in size). All the elements -- economic, social, scientific, technical, institutional -- are considered in the U.S. water quality management plans, although different elements are considered in different detail by different levels of government involved. Comprehensive Federal Water Pollution Control Act Amendments (1972) encompass Federal-State regulation of all navigable waters, require specific effluent standards for individual facilities to be implemented through permits, make mandatory the use of the best available demonstrated technology in new facilities, authorize stringent Federal standards or prohibitions for toxic discharges, strengthen and streamline Federal enforcement procedures, authorize large fines, permit citizens to bring legal actions to enforce its requirements, and strengthen the Federal grant program for municipal treatment plants while working toward self-sufficent financing of treatment plants once the current backlog of needs has been met. The Act requires States to develop a comprehensive and continuing planning process for water quality management. Plans must include not only the point source controls but also controls for diffuse land runoff and other nonpoint sources.

Indirect Instruments in Water Management

14. In Belgium, funding sources for water purification are derived from the following sources: the authorities' budgets, State subventions, loans, contributions from provinces and businesses using public sewers or authority collectors, spin-offs from the purification process, etc. The purification authorities must meet their operating and management costs, including developmental maintenance and capital costs. These costs are covered entirely by contributions from: (1) appropriate provinces (fees are prorated by the percentage population residing in the authorities' jurisdiction); (2) businesses whose waste water have a loading which exceeds the State minimum established for different industries and which are treated by the authority (fees are fixed according to the pollution loading); (3) industries whose waste waters do not exceed the minimum State requirements and are treated in their own installations. All waste water discharge is subject to authorization; non-compliance is subject to penalty. The State provides 100%

funding for the construction costs of purification works (stations and collectors) treating urban waste water (with or without industrial wastes). The State is also participating, on a two year cycle between 1975 and 1980, in aiding (between 15% and 45% rate) industry to upgrade their treatment facilities.

15. Effluent fees scaled to the size of pollution loads are not applied on a national or provincial basis in Canada. However, some individual municipalities have implemented modified forms of effluent fees in recent years. The principal economic instruments used for pollution control in Canada include incentives for technology development, tax incentives for industrial pollution controls and loan programs for municipal treatment. The Cooperative Pollution Abatement Research Program (CPAR) initiated by the federal government in cooperation with the pulp and paper industry has so far supported water and air pollution research totalling some $6 million for 100 projects. Another program, Development and Demonstration of Pollution Abatement Technology (DPAT) was initiated in 1975 as a cost shared program with Canadian industry. It is designed to stimulate the development, demonstration and use of new technology to prevent or reduce pollution. The Accelerated Capital Cost Allowance Program provides tax incentive to encourage business to control pollution. Under its terms a firm can write off the full cost of its pollution abatement equipment in two years. In all cases, care is taken in implementing these measures to ensure that competitive advantages are not introduced in international trade. In the municipal sector the major federal program, a system of loans and grants, is administered by the Central Mortgage and Housing Corporation. Under this scheme loans are available for up to 2/3 of the total cost of projects such as waste treatment plants and trunk collector systems. In addition to the Federal program, some of the provinces offer supplementary financial assistance to meet the costs of pollution abatement. Public participation is considered to be an integral and essential part of comprehensive planning studies in Canada.

16. Pollution abatement in the Federal Republic of Germany is not recognized as the public's task. A new instrument, a sewage discharge fee has been established, by which an economic lever is added to administrative instruments (like effluent standards). The fee is to be paid by the discharger (community, industry) according to the quantity and noxiousness of the sewage discharged to the river. There is no formal procedure for public participation in the planning process. In the course of the licensing procedure for a water-related project the public or at least the people affected by the project is given a chance to look it over.

17. In France, fees based on the quantity of pollutant discharges in outfall areas are collected by the basin financial agencies. These funds are redistributed to help in research studies or publications concerned with water pollution control. Consultation between local elected officials and water users is achieved through the six Basin Committees and the National Water Committee.

18. Two financial charges are provided for by Italian Law No. 319. The first is applicable to all settlements making use of a public sewage system and covers the costs of collection, removal, treatment and disposal of waste waters. The second is a tax, which can be paid, in addition to the first charge, by all productive settlements, as of the date the law goes into

effect, until the waste water discharged by these settlements meets the final quality requirements specified by law. These two charges are paid to municipalities or to inter-municipal organizations.

19 The Netherlands calculate the costs of the measures necessary for the abatement and prevention of water pollution. They must be paid by those responsible for discharging pollutants. Under the Pollution of Surface Waters Act a permit is required to discharge any pollutant or harmful substance into the water. The permit outlines the conditions under which effluents may be discharged and the cost of taking the necessary measures to comply with the conditions must be borne by the industry concerned. At the moment, all discharges of oxygen consuming effluents are taxed. From 1975 onwards, certain heavy metals are also subject to a discharge levy. The public can participate in the drawing up of water quality management plans. Also, public awareness and support are promoted by information efforts.

20. In Norway a temporary financial assistance scheme for pollution control in existing plants has been established for a ten year period (1974-1984). A similar scheme has been established for controlling pollution by municipal sewage over a fifteen year period, or until the early 1990's. Means of assistance for existing plants are: grants, preferential loans (7 per cent, two years grace period, and 10-20 years overall pay back), state guarantees for loans from private financial institutions, immediate write-off of investment expenditure, and tax-deductible allocations to funds for future pollution control investment. Means of assistance under the scheme for municipalities are grants and preferential loans. Charges are levied, to promote the economical use of water, on property that has been or could be attached to the municipal water or sewage system. Municipalities decide whether or not to impose charges and their level; the charges are paid to the municipality.

21. In Portugal actions with regard to the emission of industrial pollutants into inland waters has focused on the enforcement of progressively harsher penalties for polluters. However penalties are not sufficient and a review is underway based on the "polluter-pays" principle. For the development of water treatment structures, the central authorities have drafted a supporting plan for the construction of water and urban waste treatment plants based on shared installation costs of up to 50% (Decree-Act No. 158/70 of 13/4/70 and Decree-Act No. 574/75 of 6/10/75). Meanwhile, on a medium-term basis, public water treatment corporations are being set up to manage all activities in this field at regional levels. Public participation in all decisions, and those concerning water resource management are no exception, is highly desirable.

22. The United Kingdom has legislation which allows for charges for effluent treatment only for those discharges to public sewers where elements of charges for reception, conveyance in the sewers, and treatment including disposal of sludge at the wastewater treatment works can be levied to cover costs incurred. No charges are made for discharges to surface waters but stringent conditions may be attached to the consents to do so. These consents must be obtained for all discharges. Thus dischargers have to bear the costs of any pre-treatment necessary to comply with conditions of consent which have to be sufficient to prevent any further cost to the public in treatment of the river water, except where it is abstracted for public supply. The reorganization of the water industry in 1974 to bring the present water authorities

into being reduced the level of elected representation in water authorities. However the re-organization itself, changes in methods of raising the funds necessary to support the water authorities, and the publicity created by the drought situation of the summer of 1976, have all promoted greater public awareness of water management. The Control of Pollution Act 1974, although not implemented fully, provides for open publication of the conditions of consent to discharges, and this taken together with good public relations exercises, will allow for increased public interest in the water authorities planning processes.

23. For direct industrial dischargers, there are no effluent fees imposed in the U.S.A. States could impose such fees, but have not chosen to do so. Rather, the Federal government requires industrial discharges to meet a specified minimum level of performance at a specified date. For indirect dischargers, that is, those which discharge to a publicly-owned wastewater treatment system, there are effluent charges which encourage strength and volume reduction. Such charges are required in jurisdictions that receive Federal construction grants. An extensive program for supporting, encouraging and facilitating greater public involvement through the water quality management process has been initiated under the Federal Water Pollution Control Act Amendments (Section 208). The ideas and solutions for improving water quality must come from the local level. This insures that each plan reflects local needs and provides greater assurance that implementation will occur. The State is responsible for overseeing and participating in the development of the area wide water quality programs to insure State needs are met. The Federal public participation program has two main thrusts, informing the public and working with groups which represent a broad spectrum of public interests. At the State and local levels, agencies have developed many methods to increase communication with the general public and to provide the public with information about the decisions on water quality that will need to be made. These include developing slideshows and brochures, newsletters, water quality days, t-shirts and bumper stickers.

The Use of Models for Management Decision Making

24. Belgium has utilized mathematical modelling for certain water courses and adjacent coastal waters.

25. In Canada water quality models have been developed for several major water courses, such as the Great Lakes and the Saint John, the St. Lawrence and the Qu'Appelle Rivers. These models have contributed greatly to understanding the processes involved, but have not yet reached a stage where they have been extensively utilized for planning or management purposes. Reasons for this have been the lack of success in verifying water quality models, and the heavy demands in data collection and electronic data processing required for the hydrodynamic analysis. Basic economic problems often impede research or even the application of more mathematically rigid models to water quality management. The costs of treatment facilities quite often outweigh the evident economic benefits of a higher standard of water quality. Consequently, there is considerable controversy over the selection of water quality standards for a particular stream. Faced with these uncertainties, a crude water quality model often suffices. Nevertheless, the long-term potential of mathematical modelling for water quality management is recognized, and research is supported in Canadian universities and in major Canadian water resource research establishments.

26. In the Federal Republic of Germany, mathematical water quality models are considered to be an appropriate instrument for planning and management in the field of water quality. The Federal Minister of the Interior has therefore appointed a working panel on "mathematical river basin models" charged with the collection of knowledge available in this field and with the development of models corresponding to the condition prevailing in the Federal Republic of Germany. A comparative study of representative mathematical river basin models so far developed has been produced as an initial result, and a mathematical model investigation relating to a river basin is now to be undertaken in the form of a Pilot Study. Although the mathematical river basin models developed in the meantime can already be applied, further intensive research will be needed in order to improve the approaches so far made.

27. France considers that mathematical models can be used to clarify certain alternatives, but they must be considered only as a forecasting tool. The final decision must be made at the political level, taking into account the views of elected officials and of water users. Experiments on planning methods based on fixed water quality objectives have been tried for a number of different water courses in France.

28. In Italy, advanced mathematical models have used in the analysis of the managerial aspects of the Tiber River basin, different models evaluating special features of the problem. The problems of quality in the Tiber have been considered by means of some specific models which consist basically of a simulation model, constructed to assess the behaviour of the lower reaches of the Tiber which is affected by the urban and industrial area of Rome. The design choices refer to operating policies, pricing policies and construction of waste treatment works. The mathematical tools utilized will enable evaluation of forecasts for possible future exploitation of the Tiber's water resources.

29. The Netherlands uses a one dimensional model to predict the influence of discharges of pollutants and of cooling on the water quality in rivers, and also the influence of rivers discharging pollutants in estuaries. To predict the influence of discharges of pollutants and cooling water in lakes, estuaries and coastal waters, a two dimensional horizontal diffusion model is used by superposition of the effect of a large number of "point discharges". In cooperation with the Rand Corporation in Santa Monica, California in the U.S.A., research is being done on two- and three-dimensional grid models.

30. A mathematical model of inland and estuarine waters is considered essential to any water resource management program. Portugal, however, has not yet moved beyond the theoretical stage. The first major project calling for a mathematical model is currently being developed for the Tage estuary and others are now under consideration. The development of these models will necessarily entail studies and training activities, thus nurturing the expertise required for a more general application. In practical terms, the Tage estuary model will support the decision-making process concerning the establishment of industrial restrictions in the area of the estuary, the management of Lisbon harbour, fisheries in the estuary, and the regional sewage system plan.

31. In the United Kingdom, mathematical modelling has been accepted as a routine tool for prediction of results of different options open to water authorities in water quality planning and management. This has been as a result of the work of the former water pollution research laboratory at Stevenage, the former Water Resources Board and the demonstration afforded by the Trent study (a study of the River Trent, piloted in part by the two bodies mentioned).

32. Water quality models have been used in the U.S.A. for many years for analytical purposes. Only recently however have they been widely used to support management decision-making. With the passage of the Federal Water Pollution Control Act Amendments of 1972 a municipal and industrial discharge permitting system was established. In complex areas with several discharges it was often necessary to allocate wasteloads among dischargers in order to meet water quality standards. Models of varying sophistication were used for this purpose. Occasionally questions have been raised over model validity but generally modelling results have been accepted as the basis for discharge permits. As more data become available, models are periodically refined and recalibrated. Most modelling to date has concentrated on the allocation of BOD loads. In the next phase of water quality planning it is anticipated that these efforts will be expanded to toxic materials and to nonpoint sources.

Determination of Water Quality Objectives and Standards in International Water Courses

33. Belgium regularily participates in the meetings of the European Economic Community during which water quality standards are discussed. Some of these standards are presently in force in the country. Belgium also maintains relations with neighboring countries through bi- or tripartite commissions to deal with common water problems (by 8 joint technical sub-commissions).

34. Canadian and United States relations on most matters concerning the two countries' boundary and transboundary lakes and rivers are generally handled by the International Joint Commission (IJC). The IJC was established under the Boundary Waters Treaty of 1909 and consists of six members, three appointed by Canada and three by the United States. The Commission's approval is required for any use, obstruction, or diversion of boundary waters, or alteration upstream or downstream of the boundary which causes a change in the natural quality or quantity of flow on the other side of the boundary. The IJC is also empowered to investigate and report upon questions and matters referred to it by either government. The reports of the Commission in such referred cases are not regarded as decisions either on the facts or on the law; they are reports to the governments. In addition, questions or matters or differences between the two countries may be referred to the Commission for decision, provided that both countries consent. The most noteworthy achievement of the two countries through the Boundary Waters Treaty has been the program to reduce and control pollution of the Great Lakes, through a special international Agreement signed in 1972. The Agreement sets out specific water quality objectives to be achieved by a series of pollution control measures specified in the Agreement. Another good example is the Saint John River, where a Canada-U.S. Committee jointly developed a set of recommended water quality objectives. The IJC is currently considering the Committee's final report with a view to setting up an appropriate implementation mechanism. It is interesting to note that this Canada-U.S. Committee was first announced at the third symposium of the NATO/CCMS Pilot Project on Inland Waters Pollution.

35. For solving the water problems together with its neighbouring countries, the Federal Republic of Germany has entered into a number of bi- and multilateral arrangements. At supra-national level the Council of the European Communities has created a major point of emphasis with its Directive of 1976 concerning pollution as a result of the discharge of certain hazardous substances into the waters of the Community. Uniform limits for the entire European Economic Community (EEC) and harmonized programmes are being prepared for this purpose. Within the scope of the International Commission for the Protection of the Rhine against Pollution there have been conventions since 1976 governing the reduction of salinity and avoidance of chemical pollution. A convention on limiting the thermal loading of the Rhine is being drawn up. The Council of Europe is at present preparing a European Convention on the Protection of International Watercourse against Pollution. The draft Convention provides for the setting up of river basin commissions along international watercourses, limitation on the discharge of hazardous substances, minimum quality requirements for inland water crossing frontiers and various utilizations. The Federal Republic of Germany has developed initiatives as regards revision of the existing draft, centering above all on harmonization with the above-mentioned EEC Directive on water protection and the convention on the avoidance of chemical pollution of the Rhine. Extensive water protection measures were agreed in the International Commission for the Protection of the Mosel and Saar against Pollution and in the Water Protection Commission for Lake Constance. On the basis of bilateral agreements the Federal Republic of Germany looks after the interests of boundary waters together with its neighbouring countries, the Netherlands, Denmark and Switzerland.

36. France participates in the work of the European Council with the aim of developing a European Convention for pollution control in international waterways; this agreement will ensure that water quality objectives for international waterways are developed by the appropriate States or at least will set minimum quality standards at international boundaries. The agreement will also recommend the establishment of International Basin Commissions. Some commissions already exist (Rhin, Sarre and Moselle...). The European Economic Community is also developing grids to set quality objectives for water use which each State must use for setting their quality objectives. The following have been adopted to date: a water quality grid for potable water and a water quality grid for bathing water.

37. A number of criteria have been accepted in the Netherlands and within the European Community which are applied as far as possible when setting quality standards. Partly due to international arrangements (Rhine agreements, EEC Directives) existing national legislation will be adapted. This adaptation will make it possible to impose maximal values for polluting substances to be discharged. The annex to the report "The combat against surface water pollution in the Netherlands - prospective multi-annual programs 1975-1979" gives an indication of the minimum standards of water quality to be aimed at for the present (provisional limits) and also standards for the future (target values). The present minimum standards apply only to a transitional period.

38. Norway has concluded agreements with its neighboring countries of Sweden, Finland and the U.S.S.R. to regulate the various uses and preservation of their international water courses. A Nordic Environmental Protection Convention was signed in Stockholm in 1974 by Denmark, Finland, Norway and Sweden. The convention states that each country shall appoint a special supervisory authority to be entrusted with the task of safeguarding general environmental

interests as regards nuisances arising out of environmental activities in another contracting country. Each country defrays the cost of the activities of its supervisory authority.

39. The geographic location of Portugal has made it exclusively a "recipient" of international rivers, namely those from Spain. Thus Portugal has been trying for many years to promote cooperation with Spain in the field of river waters; cooperative arrangements to date, however, are concerned strictly with water quantity. Three such cooperative agreements are: 11/8/27 for the Douro; 16/7/68 for the Douro and its tributaries; and 29/5/68 for the Minho, Lima, Tage, Guadiana, Chança and their tributaries. These agreements regulate the hydraulic use of the international zones of the rivers, fixing minimum acceptable flows. A Luso-Spanish Commission on international river use in border areas was also established. It is hoped that this Commission will be able to take into consideration the quality of water from Spain through the efforts of a task force set up to draft a coordinated intervention program for quality studies to enable the future establishment of a water pollution control scheme.

40. The United Kingdom has few instances of international water courses, and these are minor ones between Eire and Northern Ireland which have been managed locally.

41. Salinity water quality standards have been promulgated by the United States as a result of negotiations and agreements between the U.S. and Mexico. States have adopted criteria and are committed to implementation of salinity standards.

Summary

42. From the follow-up reports from NATO Member States (Belgium, Canada, Federal Republic of Germany, France, Italy, Netherlands, Norway, Portugal, United Kingdom, U.S.A.) it is obvious most are generally following the recommendations set out by the pilot project on inland water pollution. Planning and management for water quality is generally done comprehensively on a river basin basis. Plans might vary on a geographic basis to be amalgamated in a regional or State context, or might be broken into sub-basin elements. Generally, as many elements as feasible are taken into account in the planning process, i.e. technical, scientific, social, institutional, financial, etc.

43. Both direct and indirect economic instruments are utilized as pollution control measures. In general the principle is that the user pays where it is practicable to assess costs. Public participation is becoming more generally used as an operational tool to both inform the public of ways to reduce their share of the costs of increased pollution abatement, and to ensure that public perceptions and expectations are taken into account in the planning process.

44. Mathematical modelling has become a recognized tool in Member States in clarifying water quality objectives and in prediction of effects of various planning options available to water quality managers. Member States recognize that these models are useful in assessing alternatives for development and they present quantifiable results from which political decisions can be rationally made.

45. Determination of water quality objectives and standards in international water courses are either accomplished through bi- or multi-partite agreements

negotiated between countries, or are more regularly addressed through such forums as the European Economic Community, in Europe, or through the International Joint Commission, in North America.

46. The success of any NATO/CCMS pilot project is usually measured by the action taken by countries to meet the recommendations in general, and the pilot country in particular. As can be seen from the foregoing, member countries are generally following the study recommendations. Canada designated the comprehensive river basin planning and management program for the Saint John River basin as a case study and as a focus for the Canadian contribution within the overall project. A Canada-U.S. Committee jointly developed a set of recommended water quality objectives during the course of the study. The International Joint Commission is considering the Committee's final report with a view to setting up an appropriate implementation mechanism. It is expected that an arrangement will be developed that will be somewhat similar to the Canada/U.S.A. agreement on the Great Lakes.